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Message:

In re Application of

William Pack

Application No. 09/309,844

Filed: May 11, 1999

For: MOUNTING ARRANGEMENT FOR A RADIATOR ASSEMBLY OF A WORK MACHINE

Attorney Docket No. 96-753.1

Art Unit: 3619

Examiner: J Restifo

Paper No. 29

SUPPLEMENTAL APPEAL BRIEF
Paper No. 29

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND PATENT INTERFERENCES

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Art Unit: 3619

Examiner: J Restifo

Paper No. 29

26 January 2004

Assistant Commissioner for Patents
Washington, D.C. 20231

SUPPLEMENTAL APPEAL BRIEF

Sir:

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I hereby certify that this correspondence was transmitted by facsimile to the U.S. Patent and Trademark Office, Facsimile No. (703) 872-9306, on January 26, 2004.

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APPELLANTS' BRIEF

This is a reinstated appeal from the action of the examiner rejecting claims 2 through 9, 11 through 17, and 19 through 28 as being unpatentable under 35 U.S.C. § 103.

I. Real Party In Interest

The real party in interest is Caterpillar S.A.R.L. (formerly Caterpillar Commercial S.A.R.L.), which is a subsidiary of Caterpillar Inc.

II. Related Appeals And Interferences

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. Status Of Claims

Claims 2 through 9, 11 through 17, 19 through 28, and provisionally claims 29 through 32 are pending in this application. Original claims 1, 10, and 18 have been canceled. Claims 2 through 9, 11 through 17, and 19 through 28 stand finally rejected by the examiner as being unpatentable under 35 U.S.C. §103.

IV. Status Of Amendments

An amendment after final rejection was filed on March 17, 2003, requesting entry of new claims 29 through 32 directed to certain features as invited by the examiner. The examiner refused entry of the proposed amendment because it presented additional claims without canceling a corresponding number of finally rejected claims. Appellant reiterates its request for entry of the new claims 29 through 31 on the basis that the examiner invited the amendment in the final rejection, either by the examiner or *sua sponte* by the Board of Patent Appeals and Interferences. On page 3 of the final rejection, the examiner wrote, "The examiner suggests the applicant further define that the radiator's longitudinal axis form an axis with the vehicles longitudinal axis, which may be favorable..." However, despite soliciting claim limitations as recited in proposed claims 29 through 32 so that the examiner could determine whether they are "favorable", the examiner now refuses entry and consideration of such claims and consequently refuses to determine whether the limitations are "favorable" as suggested in the final rejection.

SUPPLEMENTAL APPEAL BRIEF

Sir:

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V. Summary Of Invention

This invention relates generally to a mounting arrangement for a radiator assembly or heat exchanger for a work machine, such as an articulated dump truck. (Fig. 1). The radiator assembly may be mounted rearward of an operator cab and a linear extension of an upper edge of the radiator cooling core extends along a line that intersects the longitudinal axis of the machine frame at an angle other than 90° (Fig. 3). The work machine includes an engine assembly that may include an engine fan (Figs 1 – 2). The radiator assembly may include a radiator fan positioned rearward of the cooling core (Figs. 2 –3). The work machine may have a transmission assembly mounted to the frame that is located between the engine assembly and the radiator assembly (Fig. 1).

In another aspect, an engine assembly may be mounted on the machine frame in an engine enclosure that has an upper surface extending downwardly and forwardly from an operator cab to terminate at a forward end positioned a first distance above the frame (Fig. 1). The radiator assembly may be mounted to the machine frame rearward of the operator cab, and the upper edge of the radiator cooling core is positioned at a second, greater distance above the frame (Figs. 1 – 2). The cooling core may be positioned such that a linear extension of its upper edge extends a long a line that intersects the longitudinal axis of the machine at an angle other than 90° (Fig. 3). The engine enclosure may be devoid of a radiator assembly (Figs. 1 – 3).

In another aspect, the radiator assembly may be mounted to the machine frame such that the cab assembly is interposed between the engine assembly and the radiator assembly (Figs. 1 – 3). The cooling core may be positioned relative to the longitudinal axis of the machine frame such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between the line L_1 and the line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$ (Fig. 3). The

radiator assembly may be interposed between the cab assembly and a work implement coupled to the frame (Fig. 1).

VI. Issue

The issue before the Board is whether claims 2 through 9, 11 through 17, and 19 through 28 (and 29 through 32 if added) of this application are unpatentable under 35 U.S.C. §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 2,228,550 to Young ("Young").

VII. Grouping Of Claims

For purposes of this appeal, claims 2 through 9 stand or fall together, claims 11 through 17 stand or fall together, claims 19 through 22 stand or fall together, claim 23 stands or falls alone, and claims 24 through 28 stand or fall together. Claims 29 through 32, if added as requested above, stand or fall together.

VIII. Argument

The Examiner's Rejection.

In Paper No. 26, the examiner re-opened prosecution and, although not explicit, the examiner withdrew all prior rejections of the claims in favor of the rejection set forth in Paper No. 26. To the extent that prior rejections were not withdrawn, appellant reiterates all prior arguments.

The examiner now argues that claims 2 through 9, 11 through 17, and 19 through 28 are unpatentable under 35 U.S.C §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 2,228,550 to Young ("Young"). The examiner characterizes Couse in generally the same manner as in prior rejections and admits that Couse does not have a radiator assembly as set forth in the claims. The examiner argues that Young does disclose a radiator 20, 26, 27 for placement in a vehicle compartment 10 at an angle of less than 90 degrees for allowing a larger radiator to fit in a smaller compartment as shown in FIG. 2 of Young. The examiner argues that it would have been obvious to one of ordinary skill in the art to have provided the vehicle of Couse with the angled radiator of Young in order to allow a larger radiator with increased cooling ability to fit in a smaller compartment and thus take up less space. The examiner admits that Young does not disclose a radiator "angled horizontally" but that it would be well within the knowledge of one trained in

the art to angle the radiator horizontally rather than vertically without undue experimentation.

The examiner gives little patentable weight to the use of a fan adjacent to the radiator core on the basis that the use of such a fan is conventional.

With regard to claims 19 and 27, the examiner gives little patentable weight to the limitation "devoid of a radiator assembly" because the "auxiliary radiator" assembly of Couse could easily be removed without affecting the function an benefits of the invention. Notably, the examiner offers no support for this conclusion.

With respect to claims 23 and 24, the examiner argues that the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and thus views them as a matter of design choice.

With regard to appellant's prior arguments, examiner restates his arguments regarding "matter of design choice" with respect to claims 24 through 28 on the basis that the front hood can be made at a variety of heights without altering the function of the cooling system. On this basis, the examiner concludes that relative height of the front hood to the top surface of the radiator is not critical to the invention and should be given little patentable weight.

Claims 2 through 9

Independent claim 2 recites, among other features, a work machine in which a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is clearly not taught or suggested by Couse, Young, or the combination of Couse with Young.

With regard to Couse, the upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame

members 2 at a 90° angle. This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°.

Young, which was newly cited by the examiner in order to reopen prosecution, discloses a heat exchanger core that is adapted to be placed in an air duct or without a unitary housing where headroom is limited. The heat exchanger of Young intended to reduce the vertical space required for installation of the device without reducing the capacity of the core and without adding materially to the flow resistance. Young specifically directs the field of its disclosure toward marine vehicles such as submarines and battleships and the like. Young makes no mention of usefulness in work machines as recited in claim 2. Young specifically discloses a unit heater rather than a radiator assembly having a cooling core as recited in claim 2. The heat exchanger core of Young is tilted at an angle relative the housing 10 as shown in FIG. 2 of Young. As apparent, since FIG. 1 is a front view and FIG. 2 is a side view taken along line 2 – 2, the heat exchanger core of Young is in fact tilted in a forward direction and is perpendicular to the longitudinal axis of the housing 10, which axis is generally the same as the direction of the arrows in the right portion of FIG. 2 used primarily to indicate the direction of air flow. As stated in Young, the result is the ability to provide a "greater length than would be possible if positioned at right angles to the housing" (see col. 3, lines 14 – 18). In this regard, greater length is considered to refer to the length tubes 20 that form part of the heat exchanger core.

Neither Couse nor Young, either alone or in combination, teaches an arrangement as recited in claim 2, wherein an angle σ is defined between said line L_1 and said line L_2, and $40.0° \leq \sigma \leq 95.0$. Moreover, nothing in Couse or Young would suggest to one skilled in the art that using the claimed arrangement would be beneficial. Accordingly, the invention as recited in claim 2 would not have been obvious to one skilled in the art. In fact, one skilled in the art would not me motivated to modify Couse as suggested by the examiner because doing so would result in a drive mechanism for the Couse generator 12 position at an undesirable

angle relative to the Couse drive shaft 17, thus requiring a universal or other complicated connecting joint. Notably, this added complexity would result if the combination were made in the unsupported fashion suggested by the examiner or in the more likely combination in which the Couse auxiliary radiator would be tilted forwardly as in the Young device (no admission of motivation to combine is made). Moreover, to so modify Couse as suggested by the examiner would provide no advantage in the Couse structure and, in fact, motivation to modify Couse with a forwardly tilted radiator as in Young would not have existed at the time of the invention since nothing in Couse suggests any benefit from reducing the vertical height of the auxiliary radiator. Thus, the examiner's assertions are based on impermissible hindsight.

The arguments regarding lack of motivation to combine and non-obviousness aside, appellants further submit that Young is not properly citable as prior art in this case because (a) Young is not from the field of the instant invention and (b) Young is not directed to the same or similar problem as the subject invention. As a result, Young is non-analogous art and should not be considered "prior art" for purposes of this application.

As apparent from the plain language of claim 2, the field of the invention of claim 2 is engine driven work machines having radiator assemblies including cooling cores. This is buttressed by the "Field of the Invention" section of the specification, which states that the invention relates to the mounting arrangement for a radiator assembly of a work machine. Young relates to mounting a heater unit in a submarine, battleship, or other marine vessel, which is clearly not the field of the instant invention.

Moreover, Young is not directed to solving the same or similar problem as the invention of claim 2. For example, a problem addressed by the instant invention is providing a mounting arrangement for a radiator assembly that allows accommodation of increased cooling demand without obstructing the view of work machine operator. In contrast, the problem addressed by Young is reducing the vertical space required to mount a heat exchanger core such as a unit heater without reducing the capacity of the core and without adding materially to the air flow

resistance, particularly in submarines, battleships, and other marine vessels. The problems addressed are not the same and are indeed not even similar.

Therefore, because Young is not from the same field as the claimed invention and Young does not address the same or similar problem as the invention, Young is from a non-analogous art and should not be considered.

Claims 2 through 9 depend from claim 2 and are allowable for at least the same reasons as claim 2. Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

11 through 17

Independent claim 11 recites, among other features, that a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is also recited in independent claim 2 and is discussed above in detail. As explained above, this feature is clearly not taught or suggested by Couse, Young, or the combination of Couse with Young. Accordingly, the arguments set forth above with regard to claim 2 are repeated and incorporated herein with regard to claims 11 through 17.

In addition, claim 11 recites that the cab assembly is mounted on the main frame such that the cab assembly is interposed between the engine assembly and the radiator assembly. This feature in combination with the limitation discussed in detail above is clearly not taught or suggested by the prior art relied upon by the examiner. For example, in an arrangement in which an operator cab is located as recited in claim 11, vertical space is less likely to be at a premium and thus one skilled in the art would not look to Young for guidance since Young is directed primarily to situations where limited head room is a problem.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 11 and is thus not properly citable as prior art against claim 11.

Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

In view of the foregoing arguments, the examiner's rejection of claims 12 through 17 is improper and should be reversed.

19 through 22

Independent claim 19 recites a work machine comprising a frame having a longitudinal axis and an operator cab mounted on the frame. An engine enclosure is mounted on the frame forward of the operator cab, and **the engine enclosure is devoid of a radiator assembly** (emphasis added). An engine assembly is mounted the frame and located within the engine assembly. The engine assembly includes and engine and a fan directing cooling air over the engine. A radiator assembly is mounted to the frame rearward of the operator cab and includes a cooling core having an upper edge. **The cooling core is positioned such that a linear extension of the upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°**(emphasis added).

The examiner contends that the combination of Couse with Young teaches the limitations of claim 19. However, the combination of Couse with Young does not teach or even suggest several limitations present in claim 19. For example, both Couse teaches the use of a radiator assembly located in the engine enclosure (see FIG. 1) and Young is silent as to even using its device as a cooling radiator not to mention where it should be positioned relative to an engine enclosure of a work machine. In contrast, claim 19 clearly recites that the engine enclosure is devoid of a radiator assembly. Nothing in Couse or Young would suggest to one skilled in the art to provide an engine enclosure devoid of a radiator, as recited in claim 19, since Couse specifically teach away from the claimed arrangement and Young is at best silent on the topic. For this reason alone, nothing in the combination of Couse with Young teaches or suggests the invention recited in claim 19.

The examiner argues that the "auxiliary radiator 8" of Couse could easily be removed with out having an effect on the function of the invention. First and foremost, the examiner mischaracterized the radiator 8 as being "auxiliary" when in

fact Couse described the radiator 8 as the "main radiator 8" (see col. 2, line 25). The radiator 19 mounted outside of the engine enclosure is considered by Couse to be the "auxiliary radiator" (see col. 2, line 73). One would not be motivated to remove the "main" radiator of Couse. Moreover, the examiner's argument is purely conclusory since the examiner provides no motivation to modify Couse as suggested. Consequently, it is apparent that this inaccurate characterization of Couse is based on impermissible hindsight rather than an assessment of the claimed invention at the time the invention was made.

Independent claim 19 also recites that the radiator assembly has a cooling core positioned such that a linear extension of its upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°. This is clearly not taught or suggested by Couse, Young, or the combination of Couse and Hauser. The upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame members 2 at a 90° angle. This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°. The heat exchanger of Young is positioned so that it tiled forward relative to the axis of its housing 10, as described above. A combination of Couse with Young would result in the auxiliary radiator 19 of Couse being tilted forward rather than intersecting the longitudinal axis at an angle other than 90° as recited. As explained in more detail above with regard to claim 2, one skilled the art would not be motivated to combine Couse with Young in any fashion not to mention the fashion used by the examiner to improperly reconstruct the invention of claim 19 in hindsight.

Because neither Couse nor Hauser nor the combination of Couse and Hauser teaches or even suggests a work machine as recited in claim 1 wherein a linear extension of a top edge of a radiator cooling core intersects the longitudinal axis of the machine frame at an angle other than 90°, the examiner's rejection of claim 19 is improper and should be withdrawn.

Further, as explained above with regard to claim 2, Young is non-analogous

art with respect to the invention of claim 19 and is thus not properly citable as prior art against claim 19.

Claims 20 through 22 depend from claim 19 and are considered allowable for the same reasons as claim 19.

In view of the foregoing arguments, the examiner's rejection of claims 19 through 22 is improper and should be reversed.

Claim 23

Claim 23 depends from claim 19 and recites that the engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, that the engine enclosure upper surface termites at a forward end positioned at a first distance above the frame, and that the upper edge of the cooling core is positioned a second distance above the frame, the second distance being greater than the first distance. Claim 23 is allowable for the same reasons set forth above with regard to claim 19. Moreover, as explained below with regard to claims 24 through 28, the additional features recited in claim 23 are not taught or suggested by the prior art, especially in combination with other limitations of the parent claim 19.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 23 and is thus not properly citable as prior art against claim 23.

Therefore, the examiner's rejection of claim 23 is improper and should be reversed.

Claims 24 through 28

Independent claim 24 recites a work machine comprising a frame, an operator cab mounted on the frame, and an engine enclosure mounted on the frame forward of the operator cab. The engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, and the upper surface terminates at a first end positioned at a first distance above the frame. An engine assembly is mounted on the frame and located within the engine enclosure. A radiator assembly is mounted to the frame rearwardly of the operator cab and

includes a cooling core having an upper edge positioned a second distance above the frame. This second distance is greater than the first distance.

The examiner argues that all of the features of claim 24 are taught by the combination of Couse and Young and further that "the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and therefore are viewed as a matter of design choice". The quoted argument by examiner is a clear admission that the features of claim 24 are not taught by the combination of Couse and Young, and as explained in prior communications, the referenced feature of claim 24 is critical to the function of the invention and not a matter of design choice.

As explained in the specification, a goal of the invention of claim 24 is to allow increased radiator size to meet increased cooling demands resulting from engine emission control devices, but without negatively effecting operator visibility from the machine cab. The invention of claim 24 achieves this goal by positioning the radiator assembly rearwardly of the cab and allowing the top edge of the radiator assembly to extend above the frame a relatively larger distance. This then permits no radiator assembly or a small radiator assembly in the engine enclosure, thus permitting the use of an engine enclosure top surface having a forward end positioned at a relatively smaller distance above the frame, thereby allowing good forward visibility for the machine operator without compromising cooling capacity and, if needed, permitting improved cooling capacity. Clearly, the relative spacing of the top of the radiator and the top of the forward end of the engine enclosure top surface above the machine frame is critical to the function of the invention and is not a matter of design choice.

Because the combination of Couse and Young does not teach the invention as recited in claims 24 and the feature discussed above is critical to the invention and not a matter of design choice, the examiner's rejection of claim 24 is improper and should be withdrawn. Claims 25 through 28 depend from claim 24 are considered allowable for the at least the same reasons as claim 24. Moreover, claims 25 through 28 recite further features that are not taught or suggested by the

prior art.

In support of his rejection, the examiner has stated that "simply claiming relative heights of the front of the hood relative to the top surface of the radiator is considered a matter of design choice because the front hood can be made at a variety of heights without altering the function of the cooling arrangement and therefore is not considered critical to the invention and has been given little patentable weight". The examiner has not provided any good basis for his conclusion regarding "matter of design choice", and as will be explained below, the selection of the radiator height relative to the height of the upper surface of an engine enclosure is not a matter of design choice.

A declaration by William Pack, the inventor in this application has been previously submitted and was considered by the examiner in Paper No. 23. As indicated in the declaration, selection of the height of a radiator cooling core is critical to its function because cooling capacity is dependent upon cooling core size and cooling core size is dependent upon cooling core height. Thus, the examiner's statement that "the radiator could easily be lowered or raised without altering its function" in not correct. Increasingly stringent requirements for engine emissions have generally led to higher engine heat rejection requirements and increased cooling capacity requirement for work machine engines. Thus, designers have been driven to increase the size of radiator cooling cores, as by increasing the height of the core. At the same time, operators of work machines have increasingly demanded less obstruction of visibility from the operator cab of the machine, for example by any engine enclosure positioned forward of the operator cab. Accordingly, designers must make a trade-off between meeting increased cooling capacity requirements and conflicting operator visibility demands if a conventional arrangement is used in which the radiator is positioned in an engine enclosure forward of the operator cab. In work machines in which the radiator is positioned forward of the operator cab in an engine enclosure having an upper surface, increasing the height of the radiator to increase cooling capacity would increase the height of the engine enclosure upper surface, thus altering its function by undesirably decreasing visibility from the operator cab. Similarly, lowering the height

of the upper surface of the engine enclosure to improve operator visibility would require lowering the height of the radiator, thus altering the function of the radiator by undesirably reducing its cooling capacity (unless other dimensions or features of the radiator are changed). Clearly, the relative positioning of the top edge of the radiator cooling core and the upper surface of the engine enclosure is not merely a matter of design choice. Claims 23 through 28 (and newly added claim 32) recite an innovative arrangement in which a radiator is positioned rearward of the operator cab with an engine enclosure forward of the cab in which the forward end of the upper surface of the engine enclosure is lower relative to the machine frame than the upper edge of the radiator cooling core. This arrangement is not taught or suggested by the art cited by the examiner.

The examiner's response to the declaration and arguments presented above we merely to state that declaration is "directed towards the benefits of an increase in radiator size, not an increase in vertical position relative to the vehicle frame, which can be done without changing the radiator size. Although the top of the radiator cooling core may be raised without changing the radiator size (e.g. by merely positioned the radiator high above the frame), one skilled in the art would recognize that the top of the radiator cooler core cannot be lowered without changing the radiator size, especially since one would be motivated not to position the radiator below the machine frame where it might be more exposed to potential damage.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 24 and is thus not properly citable as prior art against claim 24.

Claims 25 through 28 depend from claim 24 and are allowable for at least the same reasons as claim 24.

In view of the foregoing argument, the examiner's rejection of claims 24 through 28 is improper and should be reversed.

Claims 29 though 32

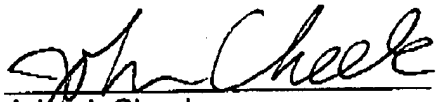
Claims 29 through 32 are added as explained above in response to a continued indication by the examiner that such claims would may treated favorably.

The examiner has provided no indication of a basis for finding claims 29 through 32 unpatentable apart from making a general reference to U.S. Patent No. 922,489 to Lea new cited in Paper No. 26. Claims 29 through 32, like their respective parent claims, are allowable for at least the same reasons set forth above.

IX. Summary

For the foregoing reasons, the examiner's action in rejecting claims 2 through 9, 11 through 17, and 19 through 28 should be *reversed*.

Respectfully submitted,



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X. Appendix - Claims On Appeal

1. CANCELED.

2. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a transmission assembly (i) mechanically coupled to said engine assembly and (ii) mounted on said main frame such that said transmission assembly is interposed between said engine assembly and said radiator assembly;

said main frame has a longitudinal axis;

said radiator assembly includes as cooling core having an upper edge;

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

3. The work machine of claim 2, further comprising a cab assembly mounted on the main frame, wherein said cab assembly is interposed between said engine assembly and said radiator assembly.

4. The work machine of claim 2, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said engine assembly.

5. The work machine of claim 2, wherein:

said work implement includes a truck bed.

6. The work machine of claim 2, wherein:

said radiator assembly include (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said engine assembly.

7. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between the engine fan and said radiator fan.

8. The work machine of claim 2, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

9. The work machine of claim 2, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

10. CANCELED

11. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a cab assembly mounted on said main frame such that said cab assembly is interposed between said engine assembly and said radiator assembly;

said main frame having a longitudinal axis;

said radiator assembly includes a cooling core having an upper edge; and

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

12. The work machine of claim 11, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said cab assembly.

13. The work machine of claim 2, wherein:

said work implement includes a truck bed.

14. The work machine of claim 11, wherein:

said radiator assembly includes (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said cab assembly.

15. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between the engine fan and said radiator fan.

16. The work machine of claim 11, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

17. The work machine of claim 11, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

18. CANCELED

19. A work machine, comprising:

a frame having a longitudinal axis;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure being devoid of a radiator assembly;

an engine assembly mounted on said frame and located within said engine enclosure, said engine assembly including an engine and an engine fan directing cooling air over said engine; and

a radiator assembly mounted to said frame rearward of said operator cab, said radiator assembly including a cooling core having an upper edge, said cooling core being positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

20. The work machine of claim 19 wherein said radiator assembly includes a radiator fan positioned rearward of said cooling core.

21. The work machine of claim 20 wherein said radiator fan is operable to drawing air through said radiator assembly and away from said operator cab.

22. The work machine of claim 19, further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

23. The work machine of claim 19 wherein said engine enclosure includes an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame, and wherein the upper edge of said cooling core is positioned a second distance above said frame, said second distance being greater than said first distance.

24. A work machine, comprising:

a frame;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure including an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame;

an engine assembly mounted on said frame and located within said engine enclosure; and

a radiator assembly mounted to said frame rearward of said operator cab, said assembly including a cooling core having an upper edge positioned a second distance above said frame, said second distance being greater than said first distance.

25. The work machine of claim 24 wherein said engine assembly includes an engine and an engine fan directing cooling air over said engine.

26. The work machine of claim 24 wherein said frame has a longitudinal axis, and wherein said cooling core is positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

27. The work machine of claim 24 wherein said engine enclosure is devoid of a radiator assembly.

28. The work machine of claim 24 further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

29. The work machine of claim 2, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

30. The work machine of claim 11, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

31. The work machine of claim 19, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

32. The work machine of claim 24, wherein said frame has a longitudinal axis, and wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

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Message:

In re Application of

William Pack

Application No. 09/309,844

Filed: May 11, 1999

For: MOUNTING ARRANGEMENT FOR A RADIATOR ASSEMBLY OF A WORK MACHINE

Attorney Docket No. 96-753.1

Art Unit: 3619

Examiner: J Restifo

Paper No. 29

SUPPLEMENTAL APPEAL BRIEF
Paper No. 29

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND PATENT INTERFERENCES

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Art Unit: 3619

Examiner: J Restifo

Paper No. 29

26 January 2004

Assistant Commissioner for Patents
Washington, D.C. 20231

SUPPLEMENTAL APPEAL BRIEF

Sir:

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence was transmitted by facsimile to the U.S. Patent and Trademark Office, Facsimile No. (703) 872-9306, on January 26, 2004.

Name: John Cheek

Date: 26 January 2004

Signature: John Cheek

SUPPLEMENTAL APPEAL BRIEF

Sir:

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V. Summary Of Invention

This invention relates generally to a mounting arrangement for a radiator assembly or heat exchanger for a work machine, such as an articulated dump truck. (Fig. 1). The radiator assembly may be mounted rearward of an operator cab and a linear extension of an upper edge of the radiator cooling core extends along a line that intersects the longitudinal axis of the machine frame at an angle other than 90° (Fig. 3). The work machine includes an engine assembly that may include an engine fan (Figs 1 – 2). The radiator assembly may include a radiator fan positioned rearward of the cooling core (Figs. 2 –3). The work machine may have a transmission assembly mounted to the frame that is located between the engine assembly and the radiator assembly (Fig. 1).

In another aspect, an engine assembly may be mounted on the machine frame in an engine enclosure that has an upper surface extending downwardly and forwardly from an operator cab to terminate at a forward end positioned a first distance above the frame (Fig. 1). The radiator assembly may be mounted to the machine frame rearward of the operator cab, and the upper edge of the radiator cooling core is positioned at a second, greater distance above the frame (Figs. 1 – 2). The cooling core may be positioned such that a linear extension of its upper edge extends a long a line that intersects the longitudinal axis of the machine at an angle other than 90° (Fig. 3). The engine enclosure may be devoid of a radiator assembly (Figs. 1 – 3).

In another aspect, the radiator assembly may be mounted to the machine frame such that the cab assembly is interposed between the engine assembly and the radiator assembly (Figs. 1 – 3). The cooling core may be positioned relative to the longitudinal axis of the machine frame such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between the line L_1 and the line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$ (Fig. 3). The

radiator assembly may be interposed between the cab assembly and a work implement coupled to the frame (Fig. 1).

VI. Issue

The issue before the Board is whether claims 2 through 9, 11 through 17, and 19 through 28 (and 29 through 32 if added) of this application are unpatentable under 35 U.S.C. §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 2,228,550 to Young ("Young").

VII. Grouping Of Claims

For purposes of this appeal, claims 2 through 9 stand or fall together, claims 11 through 17 stand or fall together, claims 19 through 22 stand or fall together, claim 23 stands or falls alone, and claims 24 through 28 stand or fall together. Claims 29 through 32, if added as requested above, stand or fall together.

VIII. Argument

The Examiner's Rejection.

In Paper No. 26, the examiner re-opened prosecution and, although not explicit, the examiner withdrew all prior rejections of the claims in favor of the rejection set forth in Paper No. 26. To the extent that prior rejections were not withdrawn, appellant reiterates all prior arguments.

The examiner now argues that claims 2 through 9, 11 through 17, and 19 through 28 are unpatentable under 35 U.S.C §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 2,228,550 to Young ("Young"). The examiner characterizes Couse in generally the same manner as in prior rejections and admits that Couse does not have a radiator assembly as set forth in the claims. The examiner argues that Young does disclose a radiator 20, 26, 27 for placement in a vehicle compartment 10 at an angle of less than 90 degrees for allowing a larger radiator to fit in a smaller compartment as shown in FIG. 2 of Young. The examiner argues that it would have been obvious to one of ordinary skill in the art to have provided the vehicle of Couse with the angled radiator of Young in order to allow a larger radiator with increased cooling ability to fit in a smaller compartment and thus take up less space. The examiner admits that Young does not disclose a radiator "angled horizontally" but that it would be well within the knowledge of one trained in

the art to angle the radiator horizontally rather than vertically without undue experimentation.

The examiner gives little patentable weight to the use of a fan adjacent to the radiator core on the basis that the use of such a fan is conventional.

With regard to claims 19 and 27, the examiner gives little patentable weight to the limitation "devoid of a radiator assembly" because the "auxiliary radiator" assembly of Couse could easily be removed without affecting the function an benefits of the invention. Notably, the examiner offers no support for this conclusion.

With respect to claims 23 and 24, the examiner argues that the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and thus views them as a matter of design choice.

With regard to appellant's prior arguments, examiner restates his arguments regarding "matter of design choice" with respect to claims 24 through 28 on the basis that the front hood can be made at a variety of heights without altering the function of the cooling system. On this basis, the examiner concludes that relative height of the front hood to the top surface of the radiator is not critical to the invention and should be given little patentable weight.

Claims 2 through 9

Independent claim 2 recites, among other features, a work machine in which a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is clearly not taught or suggested by Couse, Young, or the combination of Couse with Young.

With regard to Couse, the upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame

members 2 at a 90° angle. This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°.

Young, which was newly cited by the examiner in order to reopen prosecution, discloses a heat exchanger core that is adapted to be placed in an air duct or without a unitary housing where headroom is limited. The heat exchanger of Young intended to reduce the vertical space required for installation of the device without reducing the capacity of the core and without adding materially to the flow resistance. Young specifically directs the field of its disclosure toward marine vehicles such as submarines and battleships and the like. Young makes no mention of usefulness in work machines as recited in claim 2. Young specifically discloses a unit heater rather than a radiator assembly having a cooling core as recited in claim 2. The heat exchanger core of Young is tilted at an angle relative the housing 10 as shown in FIG. 2 of Young. As apparent, since FIG. 1 is a front view and FIG. 2 is a side view taken along line 2 – 2, the heat exchanger core of Young is in fact tilted in a forward direction and is perpendicular to the longitudinal axis of the housing 10, which axis is generally the same as the direction of the arrows in the right portion of FIG. 2 used primarily to indicate the direction of air flow. As stated in Young, the result is the ability to provide a "greater length than would be possible if positioned at right angles to the housing" (see col. 3, lines 14 – 18). In this regard, greater length is considered to refer to the length tubes 20 that form part of the heat exchanger core.

Neither Couse nor Young, either alone or in combination, teaches an arrangement as recited in claim 2, wherein an angle σ is defined between said line L_1 and said line L_2, and $40.0° \leq \sigma \leq 95.0$. Moreover, nothing in Couse or Young would suggest to one skilled in the art that using the claimed arrangement would be beneficial. Accordingly, the invention as recited in claim 2 would not have been obvious to one skilled in the art. In fact, one skilled in the art would not me motivated to modify Couse as suggested by the examiner because doing so would result in a drive mechanism for the Couse generator 12 position at an undesirable

angle relative to the Couse drive shaft 17, thus requiring a universal or other complicated connecting joint. Notably, this added complexity would result if the combination were made in the unsupported fashion suggested by the examiner or in the more likely combination in which the Couse auxiliary radiator would be tilted forwardly as in the Young device (no admission of motivation to combine is made). Moreover, to so modify Couse as suggested by the examiner would provide no advantage in the Couse structure and, in fact, motivation to modify Couse with a forwardly tilted radiator as in Young would not have existed at the time of the invention since nothing in Couse suggests any benefit from reducing the vertical height of the auxiliary radiator. Thus, the examiner's assertions are based on impermissible hindsight.

The arguments regarding lack of motivation to combine and non-obviousness aside, appellants further submit that Young is not properly citable as prior art in this case because (a) Young is not from the field of the instant invention and (b) Young is not directed to the same or similar problem as the subject invention. As a result, Young is non-analogous art and should not be considered "prior art" for purposes of this application.

As apparent from the plain language of claim 2, the field of the invention of claim 2 is engine driven work machines having radiator assemblies including cooling cores. This is buttressed by the "Field of the Invention" section of the specification, which states that the invention relates to the mounting arrangement for a radiator assembly of a work machine. Young relates to mounting a heater unit in a submarine, battleship, or other marine vessel, which is clearly not the field of the instant invention.

Moreover, Young is not directed to solving the same or similar problem as the invention of claim 2. For example, a problem addressed by the instant invention is providing a mounting arrangement for a radiator assembly that allows accommodation of increased cooling demand without obstructing the view of work machine operator. In contrast, the problem addressed by Young is reducing the vertical space required to mount a heat exchanger core such as a unit heater without reducing the capacity of the core and without adding materially to the air flow.

resistance, particularly in submarines, battleships, and other marine vessels. The problems addressed are not the same and are indeed not even similar.

Therefore, because Young is not from the same field as the claimed invention and Young does not address the same or similar problem as the invention, Young is from a non-analogous art and should not be considered.

Claims 2 through 9 depend from claim 2 and are allowable for at least the same reasons as claim 2. Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

11 through 17

Independent claim 11 recites, among other features, that a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is also recited in independent claim 2 and is discussed above in detail. As explained above, this feature is clearly not taught or suggested by Couse, Young, or the combination of Couse with Young. Accordingly, the arguments set forth above with regard to claim 2 are repeated and incorporated herein with regard to claims 11 through 17.

In addition, claim 11 recites that the cab assembly is mounted on the main frame such that the cab assembly is interposed between the engine assembly and the radiator assembly. This feature in combination with the limitation discussed in detail above is clearly not taught or suggested by the prior art relied upon by the examiner. For example, in an arrangement in which an operator cab is located as recited in claim 11, vertical space is less likely to be at a premium and thus one skilled in the art would not look to Young for guidance since Young is directed primarily to situations where limited head room is a problem.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 11 and is thus not properly citable as prior art against claim 11.

Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

In view of the foregoing arguments, the examiner's rejection of claims 12 through 17 is improper and should be reversed.

19 through 22

Independent claim 19 recites a work machine comprising a frame having a longitudinal axis and an operator cab mounted on the frame. An engine enclosure is mounted on the frame forward of the operator cab, and **the engine enclosure is devoid of a radiator assembly** (emphasis added). An engine assembly is mounted the frame and located within the engine assembly. The engine assembly includes and engine and a fan directing cooling air over the engine. A radiator assembly is mounted to the frame rearward of the operator cab and includes a cooling core having an upper edge. **The cooling core is positioned such that a linear extension of the upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°**(emphasis added).

The examiner contends that the combination of Couse with Young teaches the limitations of claim 19. However, the combination of Couse with Young does not teach or even suggest several limitations present in claim 19. For example, both Couse teaches the use of a radiator assembly located in the engine enclosure (see FIG. 1) and Young is silent as to even using its device as a cooling radiator not to mention where it should be positioned relative to an engine enclosure of a work machine. In contrast, claim 19 clearly recites that the engine enclosure is devoid of a radiator assembly. Nothing in Couse or Young would suggest to one skilled in the art to provide an engine enclosure devoid of a radiator, as recited in claim 19, since Couse specifically teach away from the claimed arrangement and Young is at best silent on the topic. For this reason alone, nothing in the combination of Couse with Young teaches or suggests the invention recited in claim 19.

The examiner argues that the "auxiliary radiator 8" of Couse could easily be removed with out having an effect on the function of the invention. First and foremost, the examiner mischaracterized the radiator 8 as being "auxiliary" when in

fact Couse described the radiator 8 as the "main radiator 8" (see col. 2, line 25). The radiator 19 mounted outside of the engine enclosure is considered by Couse to be the "auxiliary radiator" (see col. 2, line 73). One would not be motivated to remove the "main" radiator of Couse. Moreover, the examiner's argument is purely conclusory since the examiner provides no motivation to modify Couse as suggested. Consequently, it is apparent that this inaccurate characterization of Couse is based on impermissible hindsight rather than an assessment of the claimed invention at the time the invention was made.

Independent claim 19 also recites that the radiator assembly has a cooling core positioned such that a linear extension of its upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°. This is clearly not taught or suggested by Couse, Young, or the combination of Couse and Hauser. The upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame members 2 at a 90° angle. This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°. The heat exchanger of Young is positioned so that it tiled forward relative to the axis of its housing 10, as described above. A combination of Couse with Young would result in the auxiliary radiator 19 of Couse being tilted forward rather than intersecting the longitudinal axis at an angle other than 90° as recited. As explained in more detail above with regard to claim 2, one skilled the art would not be motivated to combine Couse with Young in any fashion not to mention the fashion used by the examiner to improperly reconstruct the invention of claim 19 in hindsight.

Because neither Couse nor Hauser nor the combination of Couse and Hauser teaches or even suggests a work machine as recited in claim 1 wherein a linear extension of a top edge of a radiator cooling core intersects the longitudinal axis of the machine frame at an angle other than 90°, the examiner's rejection of claim 19 is improper and should be withdrawn.

Further, as explained above with regard to claim 2, Young is non-analogous

art with respect to the invention of claim 19 and is thus not properly citable as prior art against claim 19.

Claims 20 through 22 depend from claim 19 and are considered allowable for the same reasons as claim 19.

In view of the foregoing arguments, the examiner's rejection of claims 19 through 22 is improper and should be reversed.

Claim 23

Claim 23 depends from claim 19 and recites that the engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, that the engine enclosure upper surface termites at a forward end positioned at a first distance above the frame, and that the upper edge of the cooling core is positioned a second distance above the frame, the second distance being greater than the first distance. Claim 23 is allowable for the same reasons set forth above with regard to claim 19. Moreover, as explained below with regard to claims 24 through 28, the additional features recited in claim 23 are not taught or suggested by the prior art, especially in combination with other limitations of the parent claim 19.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 23 and is thus not properly citable as prior art against claim 23.

Therefore, the examiner's rejection of claim 23 is improper and should be reversed.

Claims 24 through 28

Independent claim 24 recites a work machine comprising a frame, an operator cab mounted on the frame, and an engine enclosure mounted on the frame forward of the operator cab. The engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, and the upper surface terminates at a first end positioned at a first distance above the frame. An engine assembly is mounted on the frame and located within the engine enclosure. A radiator assembly is mounted to the frame rearwardly of the operator cab and

includes a cooling core having an upper edge positioned a second distance above the frame. This second distance is greater than the first distance.

The examiner argues that all of the features of claim 24 are taught by the combination of Couse and Young and further that "the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and therefore are viewed as a matter of design choice". The quoted argument by examiner is a clear admission that the features of claim 24 are not taught by the combination of Couse and Young, and as explained in prior communications, the referenced feature of claim 24 is critical to the function of the invention and not a matter of design choice.

As explained in the specification, a goal of the invention of claim 24 is to allow increased radiator size to meet increased cooling demands resulting from engine emission control devices, but without negatively effecting operator visibility from the machine cab. The invention of claim 24 achieves this goal by positioning the radiator assembly rearwardly of the cab and allowing the top edge of the radiator assembly to extend above the frame a relatively larger distance. This then permits no radiator assembly or a small radiator assembly in the engine enclosure, thus permitting the use of an engine enclosure top surface having a forward end positioned at a relatively smaller distance above the frame, thereby allowing good forward visibility for the machine operator without compromising cooling capacity and, if needed, permitting improved cooling capacity. Clearly, the relative spacing of the top of the radiator and the top of the forward end of the engine enclosure top surface above the machine frame is critical to the function of the invention and is not a matter of design choice.

Because the combination of Couse and Young does not teach the invention as recited in claims 24 and the feature discussed above is critical to the invention and not a matter of design choice, the examiner's rejection of claim 24 is improper and should be withdrawn. Claims 25 through 28 depend from claim 24 are considered allowable for the at least the same reasons as claim 24. Moreover, claims 25 through 28 recite further features that are not taught or suggested by the

prior art.

In support of his rejection, the examiner has stated that "simply claiming relative heights of the front of the hood relative to the top surface of the radiator is considered a matter of design choice because the front hood can be made at a variety of heights without altering the function of the cooling arrangement and therefore is not considered critical to the invention and has been given little patentable weight". The examiner has not provided any good basis for his conclusion regarding "matter of design choice", and as will be explained below, the selection of the radiator height relative to the height of the upper surface of an engine enclosure is not a matter of design choice.

A declaration by William Pack, the inventor in this application has been previously submitted and was considered by the examiner in Paper No. 23. As indicated in the declaration, selection of the height of a radiator cooling core is critical to its function because cooling capacity is dependent upon cooling core size and cooling core size is dependent upon cooling core height. Thus, the examiner's statement that "the radiator could easily be lowered or raised without altering its function" in not correct. Increasingly stringent requirements for engine emissions have generally led to higher engine heat rejection requirements and increased cooling capacity requirement for work machine engines. Thus, designers have been driven to increase the size of radiator cooling cores, as by increasing the height of the core. At the same time, operators of work machines have increasingly demanded less obstruction of visibility from the operator cab of the machine, for example by any engine enclosure positioned forward of the operator cab. Accordingly, designers must make a trade-off between meeting increased cooling capacity requirements and conflicting operator visibility demands if a conventional arrangement is used in which the radiator is positioned in an engine enclosure forward of the operator cab. In work machines in which the radiator is positioned forward of the operator cab in an engine enclosure having an upper surface, increasing the height of the radiator to increase cooling capacity would increase the height of the engine enclosure upper surface, thus altering its function by undesirably decreasing visibility from the operator cab. Similarly, lowering the height

of the upper surface of the engine enclosure to improve operator visibility would require lowering the height of the radiator, thus altering the function of the radiator by undesirably reducing its cooling capacity (unless other dimensions or features of the radiator are changed). Clearly, the relative positioning of the top edge of the radiator cooling core and the upper surface of the engine enclosure is not merely a matter of design choice. Claims 23 through 28 (and newly added claim 32) recite an innovative arrangement in which a radiator is positioned rearward of the operator cab with an engine enclosure forward of the cab in which the forward end of the upper surface of the engine enclosure is lower relative to the machine frame than the upper edge of the radiator cooling core. This arrangement is not taught or suggested by the art cited by the examiner.

The examiner's response to the declaration and arguments presented above we merely to state that declaration is "directed towards the benefits of an increase in radiator size, not an increase in vertical position relative to the vehicle frame, which can be done without changing the radiator size. Although the top of the radiator cooling core may be raised without changing the radiator size (e.g. by merely positioned the radiator high above the frame), one skilled in the art would recognize that the top of the radiator cooler core cannot be lowered without changing the radiator size, especially since one would be motivated not to position the radiator below the machine frame where it might be more exposed to potential damage.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 24 and is thus not properly citable as prior art against claim 24.

Claims 25 through 28 depend from claim 24 and are allowable for at least the same reasons as claim 24.

In view of the foregoing argument, the examiner's rejection of claims 24 through 28 is improper and should be reversed.

Claims 29 though 32

Claims 29 through 32 are added as explained above in response to a continued indication by the examiner that such claims would may treated favorably.

The examiner has provided no indication of a basis for finding claims 29 through 32 unpatentable apart from making a general reference to U.S. Patent No. 922,489 to Lea new cited in Paper No. 26. Claims 29 through 32, like their respective parent claims, are allowable for at least the same reasons set forth above.

IX. Summary

For the foregoing reasons, the examiner's action in rejecting claims 2 through 9, 11 through 17, and 19 through 28 should be *reversed*.

Respectfully submitted,

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X. Appendix - Claims On Appeal

1. CANCELED.

2. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a transmission assembly (i) mechanically coupled to said engine assembly and (ii) mounted on said main frame such that said transmission assembly is interposed between said engine assembly and said radiator assembly;

said main frame has a longitudinal axis;

said radiator assembly includes as cooling core having an upper edge;

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

3. The work machine of claim 2, further comprising a cab assembly mounted on the main frame, wherein said cab assembly is interposed between said engine assembly and said radiator assembly.

4. The work machine of claim 2, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said engine assembly.

5. The work machine of claim 2, wherein:

said work implement includes a truck bed.

6. The work machine of claim 2, wherein:

said radiator assembly include (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said engine assembly.

7. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between the engine fan and said radiator fan.

8. The work machine of claim 2, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

9. The work machine of claim 2, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

10. CANCELED

11. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a cab assembly mounted on said main frame such that said cab assembly is interposed between said engine assembly and said radiator assembly;

said main frame having a longitudinal axis;

said radiator assembly includes a cooling core having an upper edge; and

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

12. The work machine of claim 11, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said cab assembly.

13. The work machine of claim 2, wherein:

said work implement includes a truck bed.

14. The work machine of claim 11, wherein:

said radiator assembly includes (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said cab assembly.

15. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between the engine fan and said radiator fan.

16. The work machine of claim 11, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

17. The work machine of claim 11, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

18. CANCELED

19. A work machine, comprising:

a frame having a longitudinal axis;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure being devoid of a radiator assembly;

an engine assembly mounted on said frame and located within said engine enclosure, said engine assembly including an engine and an engine fan directing cooling air over said engine; and

a radiator assembly mounted to said frame rearward of said operator cab, said radiator assembly including a cooling core having an upper edge, said cooling core being positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

20. The work machine of claim 19 wherein said radiator assembly includes a radiator fan positioned rearward of said cooling core.

21. The work machine of claim 20 wherein said radiator fan is operable to drawing air through said radiator assembly and away from said operator cab.

22. The work machine of claim 19, further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

23. The work machine of claim 19 wherein said engine enclosure includes an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame, and wherein the upper edge of said cooling core is positioned a second distance above said frame, said second distance being greater than said first distance.

24. A work machine, comprising:

a frame;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure including an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame;

an engine assembly mounted on said frame and located within said engine enclosure; and

a radiator assembly mounted to said frame rearward of said operator cab, said assembly including a cooling core having an upper edge positioned a second distance above said frame, said second distance being greater than said first distance.

25. The work machine of claim 24 wherein said engine assembly includes an engine and an engine fan directing cooling air over said engine.

26. The work machine of claim 24 wherein said frame has a longitudinal axis, and wherein said cooling core is positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

27. The work machine of claim 24 wherein said engine enclosure is devoid of a radiator assembly.

28. The work machine of claim 24 further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

29. The work machine of claim 2, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

30. The work machine of claim 11, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

31. The work machine of claim 19, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

32. The work machine of claim 24, wherein said frame has a longitudinal axis, and wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

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	Department/Company USPTO - Art Unit 3619	FEB 11 2004
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Message:

In re Application of

William Pack

Application No. 09/309,844

Filed: May 11, 1999

For: MOUNTING ARRANGEMENT FOR A RADIATOR ASSEMBLY OF A WORK MACHINE

Attorney Docket No. 96-753.1

Art Unit: 3619

Examiner: J Restifo

Paper No. 29

SUPPLEMENTAL APPEAL BRIEF
Paper No. 29

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND PATENT INTERFERENCES

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In re Application of	
William Pack	Art Unit: 3619
Application No. 09/309,844	Examiner: J Restifo
Filed: May 11, 1999	Paper No. 29
For: MOUNTING ARRANGEMENT FOR A RADIATOR ASSEMBLY OF A WORK MACHINE	
Attorney Docket No. 96-753.1	

26 January 2004

Assistant Commissioner for Patents
Washington, D.C. 20231

SUPPLEMENTAL APPEAL BRIEF

Sir:

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence was transmitted by facsimile to the U.S. Patent and Trademark Office, Facsimile No. (703) 872-9306, on January 26, 2004.

Name: John Cheek

Date: 26 January 2004

Signature: John Cheek

PAGE 2/22 * RCVD AT 1/26/2004 2:26:47 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-1/2 * DNIS:8729306 * CSID: * DURATION (mm-ss):06-30

APPELLANTS' BRIEF

This is a reinstated appeal from the action of the examiner rejecting claims 2 through 9, 11 through 17, and 19 through 28 as being unpatentable under 35 U.S.C. § 103.

I. Real Party In Interest

The real party in interest is Caterpillar S.A.R.L. (formerly Caterpillar Commercial S.A.R.L.), which is a subsidiary of Caterpillar Inc.

II. Related Appeals And Interferences

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. Status Of Claims

Claims 2 through 9, 11 through 17, 19 through 28, and provisionally claims 29 through 32 are pending in this application. Original claims 1, 10, and 18 have been canceled. Claims 2 through 9, 11 through 17, and 19 through 28 stand finally rejected by the examiner as being unpatentable under 35 U.S.C. §103.

IV. Status Of Amendments

An amendment after final rejection was filed on March 17, 2003, requesting entry of new claims 29 through 32 directed to certain features as invited by the examiner. The examiner refused entry of the proposed amendment because it presented additional claims without canceling a corresponding number of finally rejected claims. Appellant reiterates its request for entry of the new claims 29 through 31 on the basis that the examiner invited the amendment in the final rejection, either by the examiner or *sua sponte* by the Board of Patent Appeals and Interferences. On page 3 of the final rejection, the examiner wrote, "The examiner suggests the applicant further define that the radiator's longitudinal axis form an axis with the vehicles longitudinal axis, which may be favorable..." However, despite soliciting claim limitations as recited in proposed claims 29 through 32 so that the examiner could determine whether they are "favorable", the examiner now refuses entry and consideration of such claims and consequently refuses to determine whether the limitations are "favorable" as suggested in the final rejection.

SUPPLEMENTAL APPEAL BRIEF

Sir:

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V. Summary Of Invention

This invention relates generally to a mounting arrangement for a radiator assembly or heat exchanger for a work machine, such as an articulated dump truck. (Fig. 1). The radiator assembly may be mounted rearward of an operator cab and a linear extension of an upper edge of the radiator cooling core extends along a line that intersects the longitudinal axis of the machine frame at an angle other than 90° (Fig. 3). The work machine includes an engine assembly that may include an engine fan (Figs 1 – 2). The radiator assembly may include a radiator fan positioned rearward of the cooling core (Figs. 2 –3). The work machine may have a transmission assembly mounted to the frame that is located between the engine assembly and the radiator assembly (Fig. 1).

In another aspect, an engine assembly may be mounted on the machine frame in an engine enclosure that has an upper surface extending downwardly and forwardly from an operator cab to terminate at a forward end positioned a first distance above the frame (Fig. 1). The radiator assembly may be mounted to the machine frame rearward of the operator cab, and the upper edge of the radiator cooling core is positioned at a second, greater distance above the frame (Figs. 1 – 2). The cooling core may be positioned such that a linear extension of its upper edge extends a long a line that intersects the longitudinal axis of the machine at an angle other than 90° (Fig. 3). The engine enclosure may be devoid of a radiator assembly (Figs. 1 – 3).

In another aspect, the radiator assembly may be mounted to the machine frame such that the cab assembly is interposed between the engine assembly and the radiator assembly (Figs. 1 – 3). The cooling core may be positioned relative to the longitudinal axis of the machine frame such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between the line L_1 and the line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$ (Fig. 3). The

radiator assembly may be interposed between the cab assembly and a work implement coupled to the frame (Fig. 1).

VI. Issue

The issue before the Board is whether claims 2 through 9, 11 through 17, and 19 through 28 (and 29 through 32 if added) of this application are unpatentable under 35 U.S.C. §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 2,228,550 to Young ("Young").

VII. Grouping Of Claims

For purposes of this appeal, claims 2 through 9 stand or fall together, claims 11 through 17 stand or fall together, claims 19 through 22 stand or fall together, claim 23 stands or falls alone, and claims 24 through 28 stand or fall together. Claims 29 through 32, if added as requested above, stand or fall together.

VIII. Argument

The Examiner's Rejection.

In Paper No. 26, the examiner re-opened prosecution and, although not explicit, the examiner withdrew all prior rejections of the claims in favor of the rejection set forth in Paper No. 26. To the extent that prior rejections were not withdrawn, appellant reiterates all prior arguments.

The examiner now argues that claims 2 through 9, 11 through 17, and 19 through 28 are unpatentable under 35 U.S.C §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 2,228,550 to Young ("Young"). The examiner characterizes Couse in generally the same manner as in prior rejections and admits that Couse does not have a radiator assembly as set forth in the claims. The examiner argues that Young does disclose a radiator 20, 26, 27 for placement in a vehicle compartment 10 at an angle of less than 90 degrees for allowing a larger radiator to fit in a smaller compartment as shown in FIG. 2 of Young. The examiner argues that it would have been obvious to one of ordinary skill in the art to have provided the vehicle of Couse with the angled radiator of Young in order to allow a larger radiator with increased cooling ability to fit in a smaller compartment and thus take up less space. The examiner admits that Young does not disclose a radiator "angled horizontally" but that it would be well within the knowledge of one trained in

the art to angle the radiator horizontally rather than vertically without undue experimentation.

The examiner gives little patentable weight to the use of a fan adjacent to the radiator core on the basis that the use of such a fan is conventional.

With regard to claims 19 and 27, the examiner gives little patentable weight to the limitation "devoid of a radiator assembly" because the "auxiliary radiator" assembly of Couse could easily be removed without affecting the function an benefits of the invention. Notably, the examiner offers no support for this conclusion.

With respect to claims 23 and 24, the examiner argues that the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and thus views them as a matter of design choice.

With regard to appellant's prior arguments, examiner restates his arguments regarding "matter of design choice" with respect to claims 24 through 28 on the basis that the front hood can be made at a variety of heights without altering the function of the cooling system. On this basis, the examiner concludes that relative height of the front hood to the top surface of the radiator is not critical to the invention and should be given little patentable weight.

Claims 2 through 9

Independent claim 2 recites, among other features, a work machine in which a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is clearly not taught or suggested by Couse, Young, or the combination of Couse with Young.

With regard to Couse, the upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame

members 2 at a 90° angle. This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°.

Young, which was newly cited by the examiner in order to reopen prosecution, discloses a heat exchanger core that is adapted to be placed in an air duct or without a unitary housing where headroom is limited. The heat exchanger of Young intended to reduce the vertical space required for installation of the device without reducing the capacity of the core and without adding materially to the flow resistance. Young specifically directs the field of its disclosure toward marine vehicles such as submarines and battleships and the like. Young makes no mention of usefulness in work machines as recited in claim 2. Young specifically discloses a unit heater rather than a radiator assembly having a cooling core as recited in claim 2. The heat exchanger core of Young is tilted at an angle relative the housing 10 as shown in FIG. 2 of Young. As apparent, since FIG. 1 is a front view and FIG. 2 is a side view taken along line 2 – 2, the heat exchanger core of Young is in fact tilted in a forward direction and is perpendicular to the longitudinal axis of the housing 10, which axis is generally the same as the direction of the arrows in the right portion of FIG. 2 used primarily to indicate the direction of air flow. As stated in Young, the result is the ability to provide a "greater length than would be possible if positioned at right angles to the housing" (see col. 3, lines 14 – 18). In this regard, greater length is considered to refer to the length tubes 20 that form part of the heat exchanger core.

Neither Couse nor Young, either alone or in combination, teaches an arrangement as recited in claim 2, wherein an angle σ is defined between said line L_1 and said line L_2, and $40.0° \leq \sigma \leq 95.0$. Moreover, nothing in Couse or Young would suggest to one skilled in the art that using the claimed arrangement would be beneficial. Accordingly, the invention as recited in claim 2 would not have been obvious to one skilled in the art. In fact, one skilled in the art would not me motivated to modify Couse as suggested by the examiner because doing so would result in a drive mechanism for the Couse generator 12 position at an undesirable

angle relative to the Couse drive shaft 17, thus requiring a universal or other complicated connecting joint. Notably, this added complexity would result if the combination were made in the unsupported fashion suggested by the examiner or in the more likely combination in which the Couse auxiliary radiator would be tilted forwardly as in the Young device (no admission of motivation to combine is made). Moreover, to so modify Couse as suggested by the examiner would provide no advantage in the Couse structure and, in fact, motivation to modify Couse with a forwardly tilted radiator as in Young would not have existed at the time of the invention since nothing in Couse suggests any benefit from reducing the vertical height of the auxiliary radiator. Thus, the examiner's assertions are based on impermissible hindsight.

The arguments regarding lack of motivation to combine and non-obviousness aside, appellants further submit that Young is not properly citable as prior art in this case because (a) Young is not from the field of the instant invention and (b) Young is not directed to the same or similar problem as the subject invention. As a result, Young is non-analogous art and should not be considered "prior art" for purposes of this application.

As apparent from the plain language of claim 2, the field of the invention of claim 2 is engine driven work machines having radiator assemblies including cooling cores. This is buttressed by the "Field of the Invention" section of the specification, which states that the invention relates to the mounting arrangement for a radiator assembly of a work machine. Young relates to mounting a heater unit in a submarine, battleship, or other marine vessel, which is clearly not the field of the instant invention.

Moreover, Young is not directed to solving the same or similar problem as the invention of claim 2. For example, a problem addressed by the instant invention is providing a mounting arrangement for a radiator assembly that allows accommodation of increased cooling demand without obstructing the view of work machine operator. In contrast, the problem addressed by Young is reducing the vertical space required to mount a heat exchanger core such as a unit heater without reducing the capacity of the core and without adding materially to the air flow

resistance, particularly in submarines, battleships, and other marine vessels. The problems addressed are not the same and are indeed not even similar.

Therefore, because Young is not from the same field as the claimed invention and Young does not address the same or similar problem as the invention, Young is from a non-analogous art and should not be considered.

Claims 2 through 9 depend from claim 2 and are allowable for at least the same reasons as claim 2. Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

11 through 17

Independent claim 11 recites, among other features, that a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is also recited in independent claim 2 and is discussed above in detail. As explained above, this feature is clearly not taught or suggested by Couse, Young, or the combination of Couse with Young. Accordingly, the arguments set forth above with regard to claim 2 are repeated and incorporated herein with regard to claims 11 through 17.

In addition, claim 11 recites that the cab assembly is mounted on the main frame such that the cab assembly is interposed between the engine assembly and the radiator assembly. This feature in combination with the limitation discussed in detail above is clearly not taught or suggested by the prior art relied upon by the examiner. For example, in an arrangement in which an operator cab is located as recited in claim 11, vertical space is less likely to be at a premium and thus one skilled in the art would not look to Young for guidance since Young is directed primarily to situations where limited head room is a problem.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 11 and is thus not properly citable as prior art against claim 11.

Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

In view of the foregoing arguments, the examiner's rejection of claims 12 through 17 is improper and should be reversed.

19 through 22

Independent claim 19 recites a work machine comprising a frame having a longitudinal axis and an operator cab mounted on the frame. An engine enclosure is mounted on the frame forward of the operator cab, and **the engine enclosure is devoid of a radiator assembly** (emphasis added). An engine assembly is mounted the frame and located within the engine assembly. The engine assembly includes and engine and a fan directing cooling air over the engine. A radiator assembly is mounted to the frame rearward of the operator cab and includes a cooling core having an upper edge. **The cooling core is positioned such that a linear extension of the upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°**(emphasis added).

The examiner contends that the combination of Couse with Young teaches the limitations of claim 19. However, the combination of Couse with Young does not teach or even suggest several limitations present in claim 19. For example, both Couse teaches the use of a radiator assembly located in the engine enclosure (see FIG. 1) and Young is silent as to even using its device as a cooling radiator not to mention where it should be positioned relative to an engine enclosure of a work machine. In contrast, claim 19 clearly recites that the engine enclosure is devoid of a radiator assembly. Nothing in Couse or Young would suggest to one skilled in the art to provide an engine enclosure devoid of a radiator, as recited in claim 19, since Couse specifically teach away from the claimed arrangement and Young is at best silent on the topic. For this reason alone, nothing in the combination of Couse with Young teaches or suggests the invention recited in claim 19.

The examiner argues that the "auxiliary radiator 8" of Couse could easily be removed with out having an effect on the function of the invention. First and foremost, the examiner mischaracterized the radiator 8 as being "auxiliary" when in

fact Couse described the radiator 8 as the "main radiator 8" (see col. 2, line 25). The radiator 19 mounted outside of the engine enclosure is considered by Couse to be the "auxiliary radiator" (see col. 2, line 73). One would not be motivated to remove the "main" radiator of Couse. Moreover, the examiner's argument is purely conclusory since the examiner provides no motivation to modify Couse as suggested. Consequently, it is apparent that this inaccurate characterization of Couse is based on impermissible hindsight rather than an assessment of the claimed invention at the time the invention was made.

Independent claim 19 also recites that the radiator assembly has a cooling core positioned such that a linear extension of its upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°. This is clearly not taught or suggested by Couse, Young, or the combination of Couse and Hauser. The upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame members 2 at a 90° angle. This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°. The heat exchanger of Young is positioned so that it tiled forward relative to the axis of its housing 10, as described above. A combination of Couse with Young would result in the auxiliary radiator 19 of Couse being tilted forward rather than intersecting the longitudinal axis at an angle other than 90° as recited. As explained in more detail above with regard to claim 2, one skilled the art would not be motivated to combine Couse with Young in any fashion not to mention the fashion used by the examiner to improperly reconstruct the invention of claim 19 in hindsight.

Because neither Couse nor Hauser nor the combination of Couse and Hauser teaches or even suggests a work machine as recited in claim 1 wherein a linear extension of a top edge of a radiator cooling core intersects the longitudinal axis of the machine frame at an angle other than 90°, the examiner's rejection of claim 19 is improper and should be withdrawn.

Further, as explained above with regard to claim 2, Young is non-analogous

art with respect to the invention of claim 19 and is thus not properly citable as prior art against claim 19.

Claims 20 through 22 depend from claim 19 and are considered allowable for the same reasons as claim 19.

In view of the foregoing arguments, the examiner's rejection of claims 19 through 22 is improper and should be reversed.

Claim 23

Claim 23 depends from claim 19 and recites that the engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, that the engine enclosure upper surface termites at a forward end positioned at a first distance above the frame, and that the upper edge of the cooling core is positioned a second distance above the frame, the second distance being greater than the first distance. Claim 23 is allowable for the same reasons set forth above with regard to claim 19. Moreover, as explained below with regard to claims 24 through 28, the additional features recited in claim 23 are not taught or suggested by the prior art, especially in combination with other limitations of the parent claim 19.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 23 and is thus not properly citable as prior art against claim 23.

Therefore, the examiner's rejection of claim 23 is improper and should be reversed.

Claims 24 through 28

Independent claim 24 recites a work machine comprising a frame, an operator cab mounted on the frame, and an engine enclosure mounted on the frame forward of the operator cab. The engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, and the upper surface terminates at a first end positioned at a first distance above the frame. An engine assembly is mounted on the frame and located within the engine enclosure. A radiator assembly is mounted to the frame rearwardly of the operator cab and

includes a cooling core having an upper edge positioned a second distance above the frame. This second distance is greater than the first distance.

The examiner argues that all of the features of claim 24 are taught by the combination of Couse and Young and further that "the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and therefore are viewed as a matter of design choice". The quoted argument by examiner is a clear admission that the features of claim 24 are not taught by the combination of Couse and Young, and as explained in prior communications, the referenced feature of claim 24 is critical to the function of the invention and not a matter of design choice.

As explained in the specification, a goal of the invention of claim 24 is to allow increased radiator size to meet increased cooling demands resulting from engine emission control devices, but without negatively effecting operator visibility from the machine cab. The invention of claim 24 achieves this goal by positioning the radiator assembly rearwardly of the cab and allowing the top edge of the radiator assembly to extend above the frame a relatively larger distance. This then permits no radiator assembly or a small radiator assembly in the engine enclosure, thus permitting the use of an engine enclosure top surface having a forward end positioned at a relatively smaller distance above the frame, thereby allowing good forward visibility for the machine operator without compromising cooling capacity and, if needed, permitting improved cooling capacity. Clearly, the relative spacing of the top of the radiator and the top of the forward end of the engine enclosure top surface above the machine frame is critical to the function of the invention and is not a matter of design choice.

Because the combination of Couse and Young does not teach the invention as recited in claims 24 and the feature discussed above is critical to the invention and not a matter of design choice, the examiner's rejection of claim 24 is improper and should be withdrawn. Claims 25 through 28 depend from claim 24 are considered allowable for the at least the same reasons as claim 24. Moreover, claims 25 through 28 recite further features that are not taught or suggested by the

prior art.

In support of his rejection, the examiner has stated that "simply claiming relative heights of the front of the hood relative to the top surface of the radiator is considered a matter of design choice because the front hood can be made at a variety of heights without altering the function of the cooling arrangement and therefore is not considered critical to the invention and has been given little patentable weight". The examiner has not provided any good basis for his conclusion regarding "matter of design choice", and as will be explained below, the selection of the radiator height relative to the height of the upper surface of an engine enclosure is not a matter of design choice.

A declaration by William Pack, the inventor in this application has been previously submitted and was considered by the examiner in Paper No. 23. As indicated in the declaration, selection of the height of a radiator cooling core is critical to its function because cooling capacity is dependent upon cooling core size and cooling core size is dependent upon cooling core height. Thus, the examiner's statement that "the radiator could easily be lowered or raised without altering its function" in not correct. Increasingly stringent requirements for engine emissions have generally led to higher engine heat rejection requirements and increased cooling capacity requirement for work machine engines. Thus, designers have been driven to increase the size of radiator cooling cores, as by increasing the height of the core. At the same time, operators of work machines have increasingly demanded less obstruction of visibility from the operator cab of the machine, for example by any engine enclosure positioned forward of the operator cab. Accordingly, designers must make a trade-off between meeting increased cooling capacity requirements and conflicting operator visibility demands if a conventional arrangement is used in which the radiator is positioned in an engine enclosure forward of the operator cab. In work machines in which the radiator is positioned forward of the operator cab in an engine enclosure having an upper surface, increasing the height of the radiator to increase cooling capacity would increase the height of the engine enclosure upper surface, thus altering its function by undesirably decreasing visibility from the operator cab. Similarly, lowering the height

of the upper surface of the engine enclosure to improve operator visibility would require lowering the height of the radiator, thus altering the function of the radiator by undesirably reducing its cooling capacity (unless other dimensions or features of the radiator are changed). Clearly, the relative positioning of the top edge of the radiator cooling core and the upper surface of the engine enclosure is not merely a matter of design choice. Claims 23 through 28 (and newly added claim 32) recite an innovative arrangement in which a radiator is positioned rearward of the operator cab with an engine enclosure forward of the cab in which the forward end of the upper surface of the engine enclosure is lower relative to the machine frame than the upper edge of the radiator cooling core. This arrangement is not taught or suggested by the art cited by the examiner.

The examiner's response to the declaration and arguments presented above we merely to state that declaration is "directed towards the benefits of an increase in radiator size, not an increase in vertical position relative to the vehicle frame, which can be done without changing the radiator size. Although the top of the radiator cooling core may be raised without changing the radiator size (e.g. by merely positioned the radiator high above the frame), one skilled in the art would recognize that the top of the radiator cooler core cannot be lowered without changing the radiator size, especially since one would be motivated not to position the radiator below the machine frame where it might be more exposed to potential damage.

Further, as explained above with regard to claim 2, Young is non-analogous art with respect to the invention of claim 24 and is thus not properly citable as prior art against claim 24.

Claims 25 through 28 depend from claim 24 and are allowable for at least the same reasons as claim 24.

In view of the foregoing argument, the examiner's rejection of claims 24 through 28 is improper and should be reversed.

Claims 29 though 32

Claims 29 through 32 are added as explained above in response to a continued indication by the examiner that such claims would may treated favorably.

The examiner has provided no indication of a basis for finding claims 29 through 32 unpatentable apart from making a general reference to U.S. Patent No. 922,489 to Lea new cited in Paper No. 26. Claims 29 through 32, like their respective parent claims, are allowable for at least the same reasons set forth above.

IX. Summary

For the foregoing reasons, the examiner's action in rejecting claims 2 through 9, 11 through 17, and 19 through 28 should be *reversed*.

Respectfully submitted,



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X. Appendix - Claims On Appeal

1. CANCELED.

2. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a transmission assembly (i) mechanically coupled to said engine assembly and (ii) mounted on said main frame such that said transmission assembly is interposed between said engine assembly and said radiator assembly;

said main frame has a longitudinal axis;

said radiator assembly includes as cooling core having an upper edge;

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

3. The work machine of claim 2, further comprising a cab assembly mounted on the main frame, wherein said cab assembly is interposed between said engine assembly and said radiator assembly.

4. The work machine of claim 2, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said engine assembly.

5. The work machine of claim 2, wherein:

said work implement includes a truck bed.

6. The work machine of claim 2, wherein:

said radiator assembly include (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said engine assembly.

7. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between the engine fan and said radiator fan.

8. The work machine of claim 2, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

9. The work machine of claim 2, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

10. CANCELED

11. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a cab assembly mounted on said main frame such that said cab assembly is interposed between said engine assembly and said radiator assembly;

said main frame having a longitudinal axis;

said radiator assembly includes a cooling core having an upper edge; and

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

12. The work machine of claim 11, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said cab assembly.

13. The work machine of claim 2, wherein:

said work implement includes a truck bed.

14. The work machine of claim 11, wherein:

said radiator assembly includes (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said cab assembly.

15. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between the engine fan and said radiator fan.

16. The work machine of claim 11, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

17. The work machine of claim 11, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

18. CANCELED

19. A work machine, comprising:

a frame having a longitudinal axis;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure being devoid of a radiator assembly;

an engine assembly mounted on said frame and located within said engine enclosure, said engine assembly including an engine and an engine fan directing cooling air over said engine; and

a radiator assembly mounted to said frame rearward of said operator cab, said radiator assembly including a cooling core having an upper edge, said cooling core being positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

20. The work machine of claim 19 wherein said radiator assembly includes a radiator fan positioned rearward of said cooling core.

21. The work machine of claim 20 wherein said radiator fan is operable to drawing air through said radiator assembly and away from said operator cab.

22. The work machine of claim 19, further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

23. The work machine of claim 19 wherein said engine enclosure includes an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame, and wherein the upper edge of said cooling core is positioned a second distance above said frame, said second distance being greater than said first distance.

24. A work machine, comprising:

a frame;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure including an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame;

an engine assembly mounted on said frame and located within said engine enclosure; and

a radiator assembly mounted to said frame rearward of said operator cab, said assembly including a cooling core having an upper edge positioned a second distance above said frame, said second distance being greater than said first distance.

25. The work machine of claim 24 wherein said engine assembly includes an engine and an engine fan directing cooling air over said engine.

26. The work machine of claim 24 wherein said frame has a longitudinal axis, and wherein said cooling core is positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

27. The work machine of claim 24 wherein said engine enclosure is devoid of a radiator assembly.

28. The work machine of claim 24 further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

29. The work machine of claim 2, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

30. The work machine of claim 11, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

31. The work machine of claim 19, wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.

32. The work machine of claim 24, wherein said frame has a longitudinal axis, and wherein said cooling core has a longitudinal axis that intersects the longitudinal axis of said frame at an angle other than 90°.